CLAIMS

I CLAIM:

1. A hot gas fluidic diverter valve, comprising:

a housing having an inner surface that forms a valve bore therein, the valve bore including a first end and a second end;

a first fluid inlet port extending through the housing and in fluid communication with the valve bore;

a second fluid inlet port extending through the housing and in fluid communication with the valve bore;

a first fluid outlet port extending through the housing and in fluid communication with the valve bore first end;

a second fluid outlet port extending through the housing and in fluid communication with the valve bore second end; and

a valve element freely disposed within the valve bore and translationally moveable between at least (i) a first position, in which the valve element substantially seals the first fluid outlet port, and (ii) a second position, in which the valve element substantially seals the second fluid outlet port,

wherein the valve bore first and second ends each have a first cross sectional area, and at least a section of the valve bore between the valve bore first and second ends has a second cross sectional area that is greater than the first cross sectional area.

2. The valve of Claim 1, further comprising:

a groove formed in the valve bore inner surface and at least partially surrounding the valve bore, to thereby form the valve bore inner surface section that has the second cross sectional area.

3. The valve of Claim 1, further comprising:

a first seat surface formed in the valve bore first end; and

a second seat surface formed in the valve bore second end,

wherein the valve element seats against the first seat surface when in the first position, and against the second seat surface when in the second position.

4. The valve of Claim 3, wherein each seat surface has a maximum cross sectional area that is less than the first cross sectional area.

5. The valve of Claim 3, wherein the valve element is substantially sphere-shaped.

6. The valve of Claim 5, wherein:

the first and second seat surfaces are at least partially sphere-shaped; and

the valve bore is substantially cylinder-shaped.

7. The valve of Claim 1, wherein the first and second fluid outlet ports are positioned substantially opposite one another.

8. The valve of Claim 1, wherein the housing comprises a metal selected from the group consisting of Inconel, ceramic, and Titanium Zirconium Molybdenum.

9. The valve of Claim 8, wherein the housing further comprises rhenium.

10. The valve of Claim 1, wherein the valve element comprises silicon nitride.

11. The valve of Claim 1, wherein the valve element comprises graphite coated with a layer of rhenium.

12. A flow control device for use with a hot gas generator having a pressure vessel and providing a combustion gas output, the flow control device comprising:

a fluidic amplifier having a fluid inlet port and at least two fluid outlet ports, the fluid inlet port adapted to receive hot pressurized fluid from the gas generator pressure vessel; and

a fluidic diverter valve including:

a housing having an inner surface that forms a valve bore therein, the valve bore including a first end and a second end,

a first fluid inlet port extending through the housing and coupling a first one of the fluidic amplifier outlet ports in fluid communication with the valve bore,

a second fluid inlet port extending through the housing and coupling a second one of the fluidic amplifier outlet ports in fluid communication with the valve bore,

a first fluid outlet port extending through the housing and in fluid communication with the valve bore first end,

a second fluid outlet port extending through the housing and in fluid communication with the valve bore second end, and

a valve element freely disposed within the valve bore and translationally moveable between at least (i) a first position, in which the valve element substantially seals the first fluid outlet port, and (ii) a second position, in which the valve element substantially seals the second fluid outlet port,

wherein the valve bore first and second ends each have a first cross sectional area, and at least a section of the valve bore inner surface between the valve bore first and second ends has a second cross sectional area that is greater than the first cross sectional area.

13. The valve of Claim 12, further comprising:

a groove formed in the valve bore inner surface and at least partially surrounding the valve bore, to thereby form the valve bore inner surface section that has the second cross sectional area.

14. The valve of Claim 12, further comprising:

a first seat surface formed in the valve bore first end; and

a second seat surface formed in the valve bore second end,

wherein the valve element seats against the first seat surface when in the first position, and against the second seat surface when in the second position.

15. The valve of Claim 14, wherein each seat surface has a maximum cross sectional area that is less than the first cross sectional area.

16. The valve of Claim 14, wherein the valve element is substantially sphere-shaped.

17. The valve of Claim 16, wherein:

the first and second seat surfaces are at least partially sphere-shaped; and

the valve bore is substantially cylinder-shaped.

18. The valve of Claim 12, wherein the first and second fluid outlet ports are positioned substantially opposite one another.

19. The valve of Claim 12, wherein the housing comprises a metal selected from the group consisting of Inconel, ceramic, and Titanium Zirconium Molybdenum.

20. The valve of Claim 19, wherein the housing further comprises rhenium.

21. The valve of Claim 12, wherein the valve element comprises silicon nitride.

22. The valve of Claim 12, wherein the valve element comprises graphite coated with a layer of rhenium.

23. A flight control system, comprising:

a controller operable to supply flight control signals;

a hot gas generator operable to supply a flow of hot pressurized gas;

one or more fluidic amplifier stages coupled to receive the flow of hot pressurized gas from the gas generator and responsive to the flight control signals to selectively divert at least a portion of the received flow of hot pressurized gas into one of at least two amplifier stage outlet ports;

at least two discharge nozzles; and

a fluidic diverter valve including:

a housing having an inner surface that forms a valve bore therein, the valve bore including a first end and a second end,

a first fluid inlet port extending through the housing and coupling a first one of the fluidic amplifier fluid outlet ports in fluid communication with the valve bore,

a second fluid inlet port extending through the housing and coupling a second one of the fluidic amplifier fluid outlet ports in fluid communication with the valve bore,

a first fluid outlet port extending through the housing and coupling a first one of the discharge nozzles in fluid communication with the valve bore,

a second fluid outlet port extending through the housing and coupling a second one of the discharge nozzles in fluid communication with the valve bore, and

a valve element freely disposed within the valve bore and translationally moveable, in response to hot pressurized fluid flow through the inlet ports, between at least (i) a first position, in which the valve element substantially seals the fluidic diverter valve first fluid outlet port, and (ii) a second position, in which the valve element substantially seals the fluidic diverter valve second fluid outlet port,

wherein the valve bore first and second ends each have a first cross sectional area, and at least a section of the valve bore inner surface, between the valve bore first and second ends, has a second cross sectional area that is greater than the first cross sectional area.